WHAT IS CLAIMED IS:

1. A system for repositioning teeth from an initial tooth arrangement to a final tooth arrangement, said system comprising a plurality of dental incremental position adjustment appliances including:

     a first appliance having a geometry selected to reposition the teeth from the initial tooth arrangement to a first intermediate arrangement;

     one or more intermediate appliances having geometries selected to progressively reposition the teeth from the first intermediate arrangement to successive intermediate arrangements; and

     a final appliance having a geometry selected to progressively reposition the teeth from the last intermediate arrangement to the final tooth arrangement.

2. A system as in claim 1, wherein the appliances comprise polymeric shells having cavities shaped to receive and resiliently reposition teeth from one arrangement to a successive arrangement.

3. A system as in claim 2, wherein the tooth positions defined by the cavities in each successive appliance differ from those defined by the prior appliance by no more than 2 mm.

4. A system as in claim 1, comprising at least two intermediate appliances.

5. A system as in claim 4, comprising at least ten intermediate appliances.

6. A system as in claim 5, comprising at least twenty-five intermediate appliances.

7. A method for repositioning teeth from an initial tooth arrangement to a final tooth arrangement, said method comprising:

     placing a first incremental position adjustment appliance in a patient's mouth, wherein the first appliance has a geometry selected to reposition the teeth from the initial tooth arrangement to a first intermediate arrangement;

7　　　　　　successively replacing one or more additional appliances,
8　　wherein the additional appliances have geometries selected to
9　　progressively reposition the teeth from the first intermediate arrangement
10　　to successive intermediate arrangements; and
11　　　　　　placing a final appliance into the patient's mouth, wherein
12　　the final appliance has a geometry selected to progressively reposition
13　　the teeth from the last intermediate arrangement to the final tooth
　　　arrangement.

1　　　　　　8.　　A method as in claim 7, wherein the appliances comprise
2　　polymeric shells having cavities shaped to receive and resiliently
　　　reposition teeth from one arrangement to a successive arrangement.

1　　　　　　9.　　A method as in claim 8, where the tooth positions
2　　defined by the cavities in each successive appliance differ from those
　　　defined by the prior appliance by no more than 2 mm.

1　　　　　　10.　　A method as in claim 7, wherein the successively placing
2　　step comprises placing at least two additional appliances prior to placing
　　　the final appliance.

1　　　　　　11.　　A method as in claim 10, wherein the successively
　　　placing step comprises placing at least ten additional appliances.

1　　　　　　12.　　A method as in claim 11, wherein the successively
　　　placing step comprises placing at least twenty-five additional appliances.

1　　　　　　13.　　A method as in claim 7, wherein the appliances are
2　　successively replaced at an interval in the range from
　　　2 days to 20 days.

1　　　　　　14.　　An improved method for repositioning teeth using
2　　appliances comprising polymeric shells having cavities shaped to receive
3　　and resiliently reposition teeth to produce a final tooth arrangement,
4　　wherein the improvement comprises determining at the outset of treatment
5　　geometries for at least three appliances which are to be worn successively
6　　by a patient to reposition teeth from an initial tooth arrangement to the
　　　final tooth arrangement.

1   15.   An improved method as in claim 14, wherein at least four geometries determined at the outset.

1   16.   An improved method as in claim 15, wherein at least ten geometries are determined at the outset.

1   17.   An improved method as in claim 16, wherein at least twenty-five geometries are determined at the outset.

1   18.   An improved method as in claim 14, wherein the tooth
2 positions defined by the cavities in each successive geometry differ from those defined by the geometry by no more than 2 mm.

1   19.   A method for producing a digital data set representing a
2 final tooth arrangement, said method comprising:
3   providing an initial digital data set representing an initial
4 tooth arrangement;
5   presenting a visual image based on the initial data set;
6   manipulating the visual image to reposition individual teeth
7 in the visual image; and
8   producing a final digital data set representing the final tooth arrangement with repositioned teeth as observed in the image.

1   20.   A method as in claim 19, wherein the step of providing a
2 digital data set representing an initial tooth arrangement comprises scanning a three-dimensional model of a patient's teeth.

1   21.   A method as in claim 20, wherein the manipulating step
2 comprises:
3   defining boundaries about at least some of the individual
4 teeth; and
5   moving at least some of the tooth boundaries relative to the other teeth in an image based on the digital data set.

1   22.   A method for producing a plurality of digital data sets
2 representing a series of discrete tooth arrangements progressing from an
3 initial to a final arrangement, said method comprising:

4   providing a digital data set representing an initial tooth
5 arrangement;

6   providing a digital data set representing a final tooth
7 arrangement;

8   producing a plurality of successive digital data sets based on
9 the provided digital data sets, wherein said plurality of digital data
10 sets represent a series of successive tooth arrangements progressing from
the initial tooth arrangement to the final tooth arrangement.

1   23.   A method as in claim 22, wherein the step of providing a
2 digital data set representing an initial tooth arrangement comprises
scanning a three-dimensional model of a patient's teeth.

1   24.   A method as in claim 22, wherein the step of providing a
2 digital data set representing a final tooth arrangement comprises:
3   defining boundaries about at least some of the individual
4 teeth; and
5   moving at least some of the tooth boundaries relative to the
6 other teeth in an image based on the digital data set to produce the final
data set.

1   25.   A method as in claim 22, wherein the step of producing a
2 plurality of successive digital data sets comprises determining positional
3 differences between the initial data set and the final data set and
interpolating said differences.

1   26.   A method as in claim 25, wherein the interpolating step
comprises linear interpolation.

1   27.   A method as in claim 25, wherein the interpolating step
comprises non-linear interpolation.

1   28.   A method as in claim 25, further comprising defining one
2 or more key frames between the initial tooth arrangement and final tooth
arrangement and interpolating between the key frames.

1   29.   A method for fabricating a plurality of dental
2 incremental position adjustment appliances, said method comprising:

3   providing a digital data set representing an initial tooth
4   arrangement;

5   providing a digital data set representing a final tooth
6   arrangement;

7   producing a plurality of successive digital data sets based on
8   the provided digital data sets, wherein said plurality of digital data
9   sets represent a series of successive tooth arrangements progressing from
10 the initial tooth arrangement to the final tooth arrangement; and
11   fabricating appliances based on at least some of the produced
digital data sets.

1   30.   A method as in claim 29, wherein the step of providing a
2   digital data set representing an initial tooth arrangement comprises
scanning a three-dimensional model of a patient's teeth.

1   31.   A method as in claim 29, wherein the step of providing a
2   digital data set representing a final tooth arrangement comprises:
3   defining boundaries about at least some of the individual
4   teeth; and
5   moving at least some of the tooth boundaries relative to the
6   other teeth in an image based on the digital data set to produce the final
data set.

1   32.   A method as in claim 29, wherein the step of producing a
2   plurality of successive digital data sets comprises determining positional
3   differences between the initial data set and the final data set and
interpolating said differences.

1   33.   A method as in claim 32, wherein the interpolating step
comprises linear interpolation.

1   34.   A method as in claim 32, wherein the interpolating step
comprises non-linear interpolation.

1   35.   A method as in claim 32, further comprising defining
2   one or more key frames between the initial tooth arrangement and final
tooth arrangement and interpolating between the key frames.

36.   A method as in claim 29, wherein the fabricating step comprises:

controlling a fabrication machine based on the successive digital data sets to produce successive positive models of the successive tooth arrangements; and

producing the dental appliance as a negative of the positive model.

37.   A method as in claim 36, wherein the controlling step comprises:

providing a volume of non-hardened polymeric resin; and

scanning a laser to selectively harden the resin in a shape based on the digital data set to produce the positive model.

38.   A method as in claim 36, wherein the producing step comprises modeling the appliance over the positive model.

39.   A method for fabricating a dental appliance, said method comprising:

providing a digital data set representing a modified tooth arrangement for a patient;

controlling a fabrication machine based on the digital data set to produce a positive model of the modified tooth arrangement; and

producing the dental appliance as a negative of the positive model.

40.   A method as in claim 39, wherein the controlling step comprises:

providing a volume of non-hardened polymeric resin;

scanning a laser to selectively harden the resin in a shape based on the digital data set to produce the positive model.

41.   A method as in claim 39, wherein the producing step comprises molding the appliance over the positive model.

42.   A method for fabricating a dental appliance, said method comprising:

3   providing a first digital data set representing a modified

4 tooth arrangement for a patient;

5   producing a second digital data set from the first data set,

6 wherein the second data set represents a negative model of the modified

7 tooth arrangement; and

8   controlling a fabrication machine based on the second digital

data set to produce the dental appliance.

1   43.   A method as in claim 42, wherein the controlling step

2 comprises selectively hardening a non-hardened resin to produce the

appliance and separating the appliance from the remaining liquid resin.

1   44.   A method as in claim 42, wherein the appliance comprises

2 a polymeric shell having a cavity shaped to receive and resiliently

3 reposition teeth from an initial tooth arrangement to the modified tooth

arrangement.